REMARKS

Initially, Applicants' attorney notes that the present Amendment has been prepared in accordance with the revised amendment format published in the Official Gazette Notice on February 25, 2003. More particularly, the revised amendment format is prepared in accordance with proposed revisions to 37 CFR 1.121. In such circumstances, Applicants' attorney respectfully requests waiver of the format requirements of 37 CFR 1.121.

As shown as the claims presented in this amendment, Claims 1, 7, 8, 11 and 12 have been cancelled. Claims 2-6, 9-10 and 13 have been amended. New independent Claims 14 and 18 have been added to replace independent claims 1 and 12, and Claims 15-17 have been added as dependent claims to Claim 14.

With reference to the Examiner's objections outlined in the Office Action of January 15, 2003, it is first noted that the Examiner has objected to the Information Disclosure Statement filed on October 1, 2001. The Examiner noted that the Information Disclosure Statement failed to comply with 37 C.F.R. 1.98(a)(1), which requires that all patents, publications, or other information submitted for consideration in an application be submitted on a form acceptable to the Office. Applicants' attorney respectfully submits that an Information Disclosure Statement was submitted with a Form PTO-1449 listing all of the patents and publications to be considered. The enclosed copy of the return postcard confirms the receipt of the IDS and the Form PTO-1449 by the United States Patent and Trademark Office on October 1, 2001. Therefore, Applicants' attorney respectfully requests that the patents and publications listed in the Information Disclosure Statement filed on October 1, 2001 and in the enclosed copy of the Form PTO-1449 be made of record. For the Examiner's convenience, Applicants' attorney has enclosed herewith a copy of the Form PTO-1449.

With reference to the second objection in the Office Action, the Examiner objected to original Claims 5-11 under 37 C.F.R. 1.75(c), as being in improper multiple dependent claim format. The aforesaid second objection has been addressed by the foregoing

amendments, therefore, Applicants' attorney respectfully requests that Claims 5-11 be examined.

The Examiner rejected Claims 1, 3, 4, 12 and 13 under 35 U.S.C. 102(b) as being anticipated by *Kumagai et al.* (U.S. Patent No. 4,810,597). Applicants' attorney respectfully traverses these rejections for the following reasons.

The present invention relates to an improved fuel cell system and a method for regulating the fuel concentration in a fuel mixture for such a system. As recited in the independent apparatus Claim 12, the fuel cell system includes a mixing space with a controllable fuel inlet and measurement probe comprising a measurement chamber, a membrane selectively permeable to water and to the fuel in the fuel mixture, and a sensor for determining the fuel concentration in the measurement chamber. The fuel cell system also includes a means by which the amount of fuel mixture at the fuel inlet can be controlled as a function of the fuel concentration in the measurement chamber. As recited in the independent method Claim 1, the fuel from the fuel mixture permeates through the membrane into the measurement chamber at a rate determined by concentrations of water and fuel in the fuel mixture, and the fuel concentration in the measurement chamber is determined. The flow rate of the fuel at the inlet is controlled so as to maintain the concentration of the fuel in the measurement chamber at a constant concentration.

It is respectfully submitted that the *Kumagai* reference does not anticipate or make obvious the present invention as defined in independent Claims 1 and 12. *Kumagai* discloses a number of embodiments of a single concept wherein the fuel cell system comprises a methanol concentration control device that measures the open-circuit cell voltage of the fuel cell and uses the measured voltage to control the flow rates of methanol and water and, thus, to maintain the open-circuit cell voltage within a desired range. In every embodiment presented in *Kumagai*, the fuel mixture itself is included as part of the methanol concentration detecting portion of the fuel cell system (e.g., the fuel mixture may directly contact one or both of the

electrodes or may be part of the open circuit). In the present invention, the fuel mixture composition is determined indirectly by measurements made in a measurement chamber that is separated from the fuel mixture feedline by the selectively permeable membrane. Because the membrane is selectively permeable, the concentration of fuel in the measurement chamber may be controlled within a range that is different than the concentration of the fuel in the fuel mixture. An advantage of the present invention, over the art presented in *Kumagai*, is that the fuel concentrations attained in the measurement chamber can be set to a range that can be more rapidly and accurately measured than the range of fuel concentrations present in the fuel mixture itself.

Applicants' note that, in *Kumagai*, the embodiments of FIG. 2 and FIG. 11 may, at first reading, appear to include a measurement chamber with a membrane, similar to those in the present invention. Applicants' respectfully direct the Examiner's attention to the distinctions between these embodiments and the present invention. In the embodiment of FIG. 2, the methanol concentration detecting portion is provided with a fuel electrode (1) in contact with the fuel (16) passing through the fuel feed pipe (9), an oxidant electrode (2) opposed to the fuel electrode (1) and in contact with a side stream (6) of the air fed to the fuel cell, and an electrolyte-saturated (or "ion-exchange") membrane (3) which provides the electrical connection between the fuel electrode (1) and the oxidant electrode (2). (Col.1, line 57 to col. 2, line 28). Therefore, the fuel in the fuel feed pipe is directly involved in the measurement. Moreover, there is no indication in the *Kumagai* reference that the methanol fuel (16) permeates from the fuel stream (16) to the air stream (6) through the membrane (3)

In the embodiment of FIG. 11, the methanol concentration detecting portion is disposed in a branch pipe that conveys a side stream of the fuel stream. A diaphragm (3) is situated between the oxidant electrode (2) and the counter-electrode (24). The space between the diaphragm (3) and the counter-electrode (24) define a space that is filled with a standard anolyte of constant composition so that the counter-electrode (24) is held at a constant

potential. This implies that the methanol fuel does not migrate across the diaphragm from the fuel pipe into the standard anolyte, otherwise the potential of the counter-electrode would change as the quantity of methanol in the anolyte changed. Moreover, the diaphragm (3) is described as providing a current path between the oxidant electrode (2) and the counter-electrode (24), so that the fuel in the fuel feed pipe is directly involved in the measurement. Nowhere in *Kumagai* is the diaphragm (3) described as being permeable to the methanol fuel. (Col. 6, line 51 to col. 7, line 11).

As the measurement systems of *Kumagai* and the present invention operate on different principles, it is respectfully submitted that *Kumagai* does not anticipate the fuel cell system of Claim 12 or the method of Claim 1.

In view of the foregoing amendments and the comments presented above, the examination and allowance of Claims 1-18 are respectfully requested. However, should there remain any questions or other matters whose resolution could be advanced by a telephone call, the Examiner is cordially invited to contact Applicants' attorney at the telephone number indicated below.

Enclosed is an Extension Petition for a one-month extension of time for response to and including May 15, 2003, for which a $110 fee is due. No other fees are believed to be due in connection with the submission of this Amendment. However, if any additional fees, including extension fees, are due, the Examiner is authorized to charge them to Deposit Account No. 19-1218.

Respectfully Submitted,

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